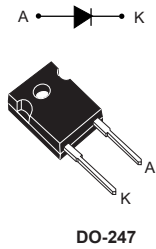


Automotive turbo 2 ultrafast high voltage rectifier



Features

- AEC-Q101 qualified
- High junction temperature capability
- Ultrafast with soft recovery behavior
- Low reverse current
- Low thermal resistance
- Reduced switching and conduction losses
- PPAP capable

Description

The [STTH60RQ06-Y](#) has been developed for applications requiring a high-voltage secondary rectification for LLC full bridge topology.

Also it is ideal for switching power supplies, industrial and automotive applications, as rectification, freewheeling and clamping diode.

| Product status link | |
|------------------------------|----------------|
| STTH60RQ06-Y | |
| Product summary | |
| Symbol | Value |
| $I_{F(AV)}$ | 60 A |
| V_{RRM} | 600 V |
| $V_{F(max)}$ | 1.45 V |
| $t_{rr(max)}$ | 35 ns |
| T_j | -40 to +175 °C |

1 Characteristics

Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified)

| Symbol | Parameter | | Value | Unit |
|--------------|---|---------------------------------|-------------|------|
| V_{RRM} | Repetitive peak reverse voltage ($T_j = -40\text{ °C}$ to $+175\text{ °C}$) | | 600 | V |
| $I_{F(RMS)}$ | Forward rms current | | 90 | A |
| $I_{F(AV)}$ | Average forward current | | 60 | A |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\text{ ms}$ sinusoidal | 425 | A |
| T_{stg} | Storage temperature range | | -65 to +175 | °C |
| T_j | Operating junction temperature range | | -40 to +175 | °C |

Table 2. Thermal resistance parameters

| Symbol | Parameter | Max. | Unit |
|---------------|------------------|------|------|
| $R_{th(j-c)}$ | Junction to case | 0.38 | °C/W |

Table 3. Static electrical characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|-----------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = V_{RRM}$ | - | | 80 | μA |
| | | $T_j = 150\text{ °C}$ | | - | 160 | 1600 | |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 30\text{ A}$ | - | | 2.45 | V |
| | | $T_j = 150\text{ °C}$ | | - | 1.15 | 1.45 | |
| | | $T_j = 25\text{ °C}$ | $I_F = 60\text{ A}$ | - | | 2.95 | |
| | | $T_j = 150\text{ °C}$ | | - | 1.45 | 1.85 | |

1. Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$

2. Pulse test: $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 1.05 \times I_{F(AV)} + 0.013 \times I_{F(RMS)}^2$$

Table 4. Dynamic electrical characteristics

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|----------|--------------------------|-----------------------|--|------|------|------|------|
| t_{rr} | Reverse recovery time | $T_j = 25\text{ °C}$ | $I_F = 0.5\text{ A}$, $I_{rr} = 0.25\text{ A}$, $I_R = 1\text{ A}$ | - | | 35 | ns |
| | | | $I_F = 1\text{ A}$, $V_R = 30\text{ V}$, $di_F/dt = -50\text{ A}/\mu\text{s}$ | - | 50 | 65 | |
| I_{RM} | Reverse recovery current | $T_j = 125\text{ °C}$ | $I_F = 60\text{ A}$, $V_R = 400\text{ V}$, $di_F/dt = -200\text{ A}/\mu\text{s}$ | - | 12 | 16 | A |
| Q_{rr} | Reverse recovery charge | | | - | 660 | | nC |
| t_{rr} | Reverse recovery time | | | - | 92 | | ns |

1.1 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current (square waveform)

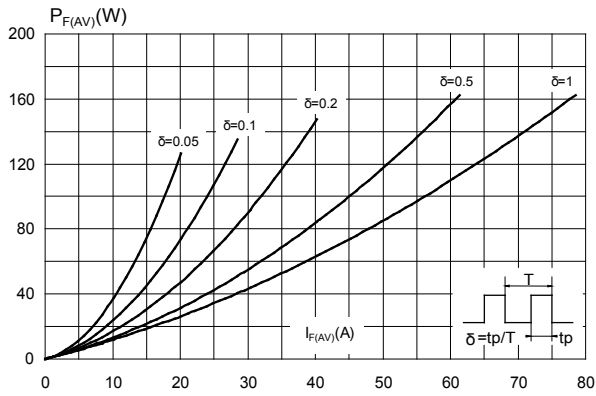


Figure 2. Average forward power dissipation versus average forward current (sinusoidal waveform)

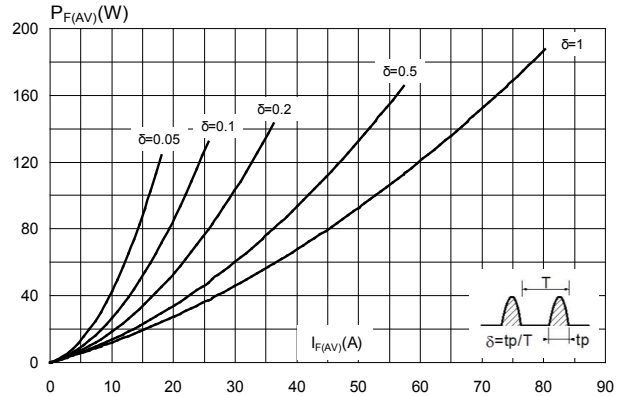


Figure 3. Forward voltage drop versus forward current (typical values)

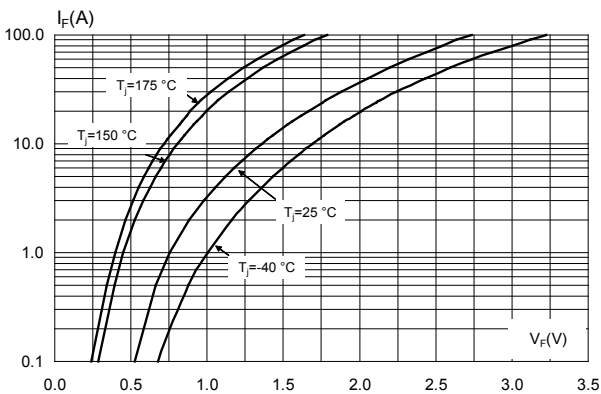


Figure 4. Forward voltage drop versus forward current (maximum values)

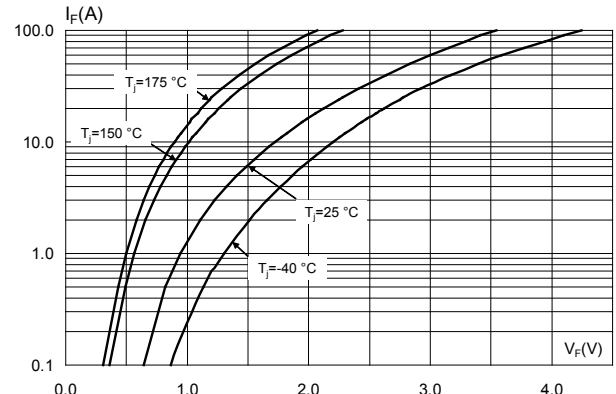


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

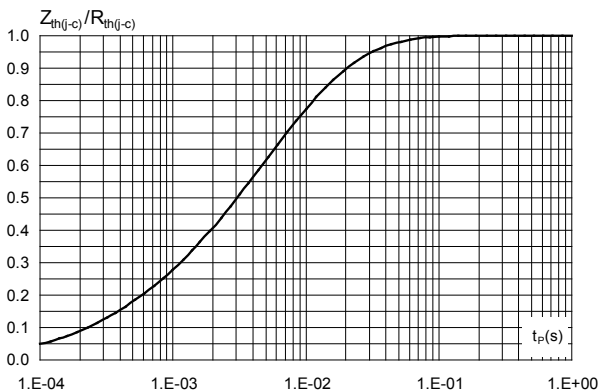


Figure 6. Peak reverse recovery current versus di_F/dt (typical values)

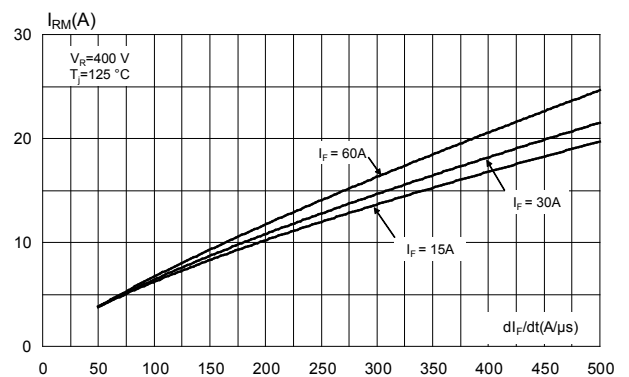


Figure 7. Reverse recovery time versus di_F/dt (typical values)

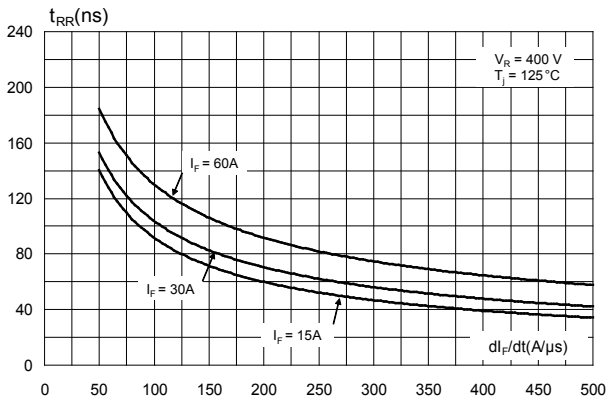


Figure 8. Reverse recovery charges versus di_F/dt (typical values)

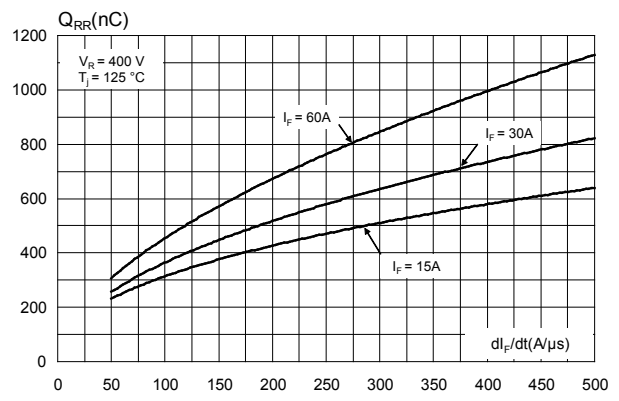


Figure 9. Reverse recovery softness factor versus di_F/dt (typical values)

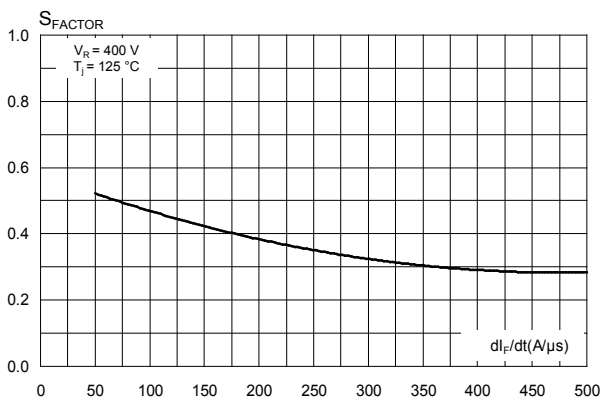


Figure 10. Relative variations of dynamic parameters versus junction temperature

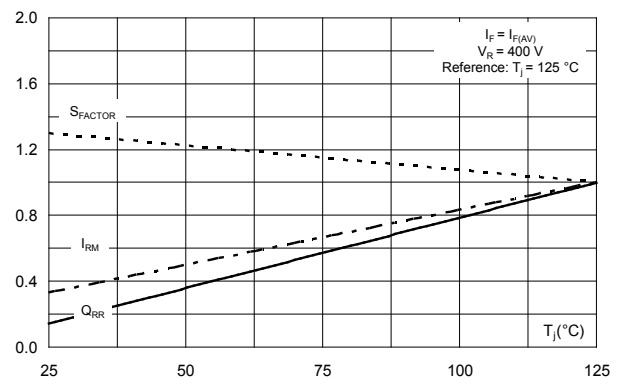


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

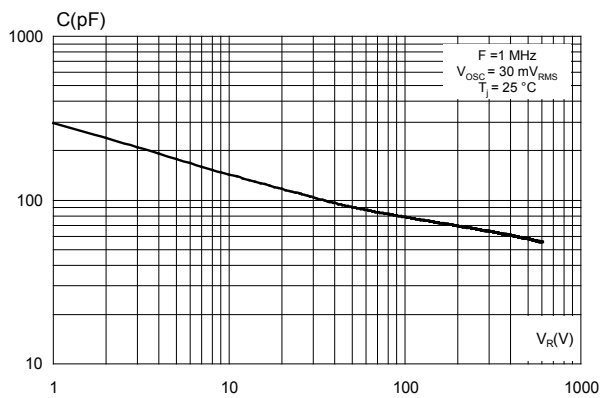


Figure 12. Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

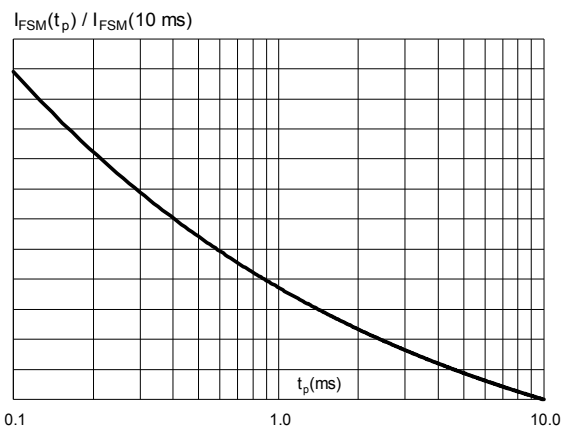
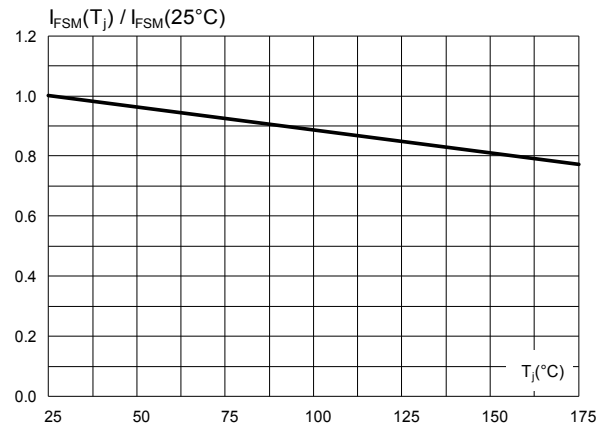


Figure 13. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)



2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

2.1 [Package name] package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 N·m (DO-247)
- Maximum torque value: 1.0 N·m (DO-247)

Figure 14. DO-247 package outline

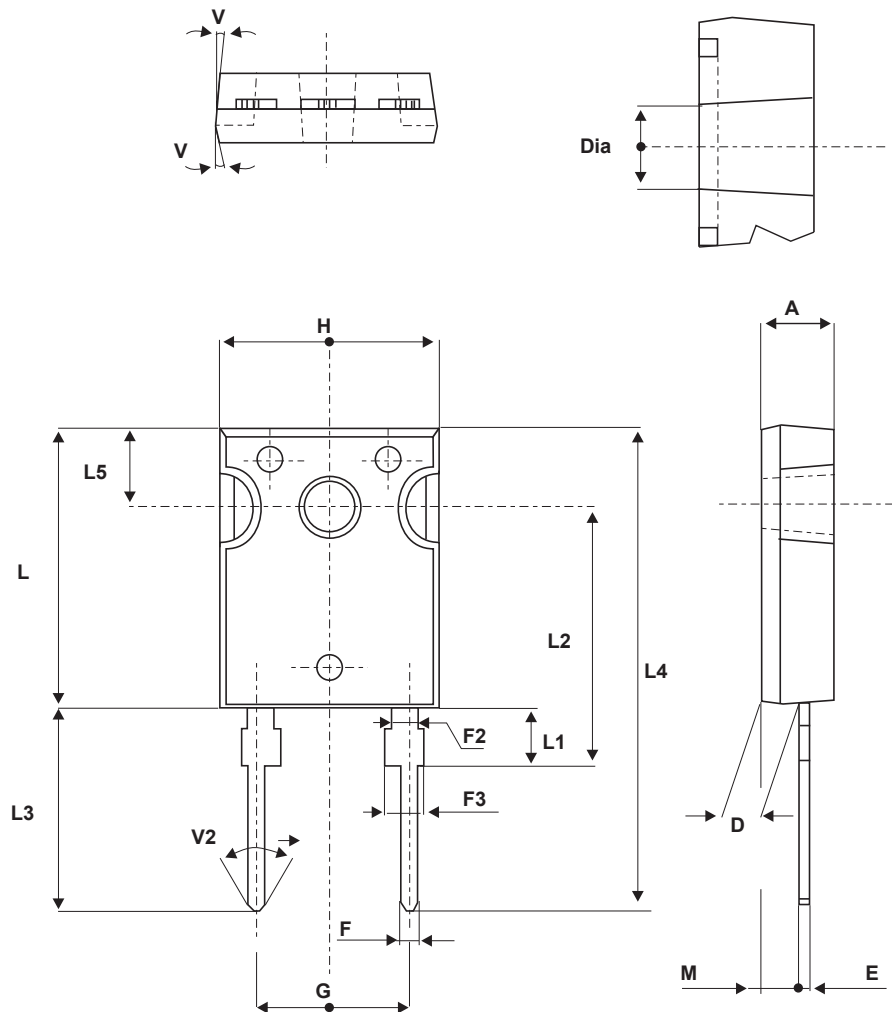


Table 5. DO-247 package mechanical data

| Ref. | Dimensions | | | |
|------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.85 | 5.15 | 0.191 | 0.203 |
| D | 2.20 | 2.60 | 0.086 | 0.102 |
| E | 0.40 | 0.80 | 0.015 | 0.031 |
| F | 1.00 | 1.40 | 0.039 | 0.055 |
| F2 | 2.00 typ. | | 0.078 typ. | |
| F3 | 2.00 | 2.40 | 0.078 | 0.094 |
| G | 10.90 typ. | | 0.429 typ. | |
| H | 15.45 | 15.75 | 0.608 | 0.620 |
| L | 19.85 | 20.15 | 0.781 | 0.793 |
| L1 | 3.70 | 4.30 | 0.145 | 0.169 |
| L2 | 18.50 typ. | | 0.728 typ. | |
| L3 | 14.20 | 14.80 | 0.559 | 0.582 |
| L4 | 34.60 typ. | | 1.362 typ. | |
| L5 | 5.50 typ. | | 0.216 typ. | |
| M | 2.00 | 3.00 | 0.078 | 0.118 |
| V | 5° | | 5° | |
| V2 | 60° | | 60° | |
| Dia. | 3.55 | 3.65 | 0.139 | 0.143 |

3 Ordering information

Table 6. Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|--------------|--------------|---------|--------|-----------|---------------|
| STTH60RQ06WY | STTH60RQ06WY | DO-247 | 4.40 g | 30 | Tube |

Revision history

Table 7. Document revision history

| Date | Version | Changes |
|-------------|---------|--|
| 20-Mar-2018 | 1 | Initial release. |
| 05-Apr-2018 | 2 | Updated Section • Features . Minor text changes to improve readability. |

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